

**DEPARTMENT OF MINES, MINERALS AND ENERGY**  
**DIVISION OF MINED LAND RECLAMATION**

**GUIDANCE MEMORANDUM<sup>1</sup> No. 22-08**

**Issue Date: February 1, 2008**

**Subject: Forestry Reclamation Approach**

The Department of Mines, Minerals and Energy (DMME), Division of Mined Land Reclamation (DMLR) through this guidance memorandum is replacing **DMLR Memorandum to Operators No. 3-96** and **DMLR Guidance Memorandum No. 2-01** with this memorandum by consolidating the information of the aforementioned memoranda and providing the recommended practices for a Forestry Reclamation Approach (FRA).

Historically, we have learned that some reclamation practices have resulted in three prevalent problems concerning reforestation and timber production: 1) excessively compacted mine soil, 2) inappropriate spoil material, and 3) competition from herbaceous ground covers established to control erosion.

The FRA husbandry practices outlined below should enhance reforestation efforts. In reclaiming areas to establish a successful forestry community, the company should give particular attention to -

1. Spoil Selection – In addition to available topsoil, at least four feet of good quality mine spoil (i.e., best available material) should be placed on the surface to accommodate the needs of deeply rooted trees. Mine spoils with low to moderate levels of soluble salts, and equilibrium pH of 4.5 to 6.5, and a sandy loam texture are preferred. Oxidized sandstone found near the surface in most areas of the coalfields weathers quickly into good soil medium for trees; however, it must meet required pH limits.
2. Grading – Minimizing soil compaction is extremely important. The problem is more prevalent on level areas that could be very productive if excessive compaction is avoided. Performing the dumping and leveling in separate operations should minimize compaction that occurs during the final lift. Trucks delivering the final

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<sup>1</sup> This Memorandum is to be considered a guideline issued under the authority of § [45.1-230](#).A1 of the Code of Virginia which reads:

"In addition to the adoption of regulations under this chapter, the Director may at his discretion issue or distribute to the public interpretative, advisory or procedural bulletins or guidelines pertaining to permit applications or to matters reasonably related thereto without following any of the procedures set forth in the Administrative Process Act (§ 2.2-4000 et seq.). The materials shall be clearly designated as to their nature, shall be solely for purposes of public information and education, and shall not have the force of regulations under this chapter or under any other provision of this Code."

layer of overburden can place the spoil in tightly spaced piles across the whole area. After the spoil is in place, a bulldozer can knock the tops off the piles and gently level the area with one or two passes. These practices can be utilized in areas where slope ratios are 2:1 or less. In steeper areas, other methods such as cable dragging may be used, for leveling the final material that is dumped.

3. Tree-compatible groundcover – Reforestation requires a carefully planned balance between ground cover for erosion control and the trees' requirements for light, water and space. Ground covers should include grass and legume species that are slow growing, have a sprawling growth form, and are tolerant of acidic (pH 4.5 to 6.5), infertile mine soils. Tree-compatible ground covers are designed to be relatively sparse during the first year and become increasingly lush by the second and third year. This allows tree seedlings to emerge above the ground cover and ensures their survival. K-31 tall fescue and all clovers (except ladino) should be avoided. Typical seed mixtures for forestry post mining land use –

Species	Rate – lbs/acre		Species	Rate – lbs/acre
Foxtail millet (spring only)	2		Orchard grass (on steep slopes only)	5
Rye (fall only)	10		Kobe lespedeza	2
Red top	1		Birdsfoot trefoil	5
Weeping lovegrass	2		Appalow lespedeza	2
Perennial ryegrass	10		Ladino clover	3
Timothy	5		Fertilizer of 16-27-14	300
Annual Rye	20		& 0-60-0	100

4. Tree species selection – Two categories of tree species are recommended: 1) crop trees and 2) nitrogen fixing nurse trees. Crop trees are long-lived species that offer value to landowners as salable forest products. Nurse trees and nurse shrubs species recommended for reclamation planting are nitrogen-fixing plants that benefit crop trees and provide food and cover for wildlife. Examples of crop trees and nurse trees/shrub species –

Crop trees	Nurse trees or shrubs
<b>Pines:</b> <i>pitch x loblolly pine hybrid, white pine, Virginia pine</i>	<i>Black Locust</i> (should not be used with <i>white pine</i> ); <i>European black alder</i> (use with <i>white pine</i> ); <i>Bicolor Lespedeza</i> ; <i>Sawtooth Oak</i> ; <i>Indigo Bush</i> ; <i>Bristly Locust</i>
<b>Hardwoods:</b> <i>yellow poplar, oak species, white ash, sycamore, red maple, sugar maple, black cherry</i>	

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While these crop trees are appropriate for mine reclamation, an operator/landowner may wish to use some species and avoid other species if the silvicultural activity is also to serve as a carbon sequestration project. An operator that wishes to participate in a carbon sequestration project or other type of project should obtain recommendations for the specific species to use from reliable sources such as Virginia Tech's [Powell River Project](#), the Virginia [Nature Conservancy](#), Virginia [Department of Forestry](#), the Appalachian Regional Reforestation Initiative ([ARRI](#)), or DMME.

5. Proper tree planting techniques. (see the Virginia Department of Forestry's recommendations at <http://www.dof.virginia.gov/mgt/how-to-plant-seedling.shtml>)
6. Husbandry practices – to promote reforestation, which should include, but not be limited to -
  - a) Split fertilizer application
  - b) Ground cover – The permit plans should address the proposed herbaceous ground cover that will be established that is compatible for superior tree survival and growth rates.
  - c) Species specific stem count for crop trees – Either pines or hardwoods may be selected. Hardwoods should be planted in mixtures of 3 or more species on approximate spacing of 10 feet by 10 feet to achieve a stand of 400 to 450 trees per acre.
  - d) Nurse trees/shrubs – planted or hydroseeded with groundcover. Seedlings should be interplanted on a 15 X 15 feet spacing to achieve approximately 200 per acre. More than 200 stems per acre by age 2 will have negative impact on crop trees.
  - e) Spot herbicide application – This is recommended when ground cover growth is especially vigorous to reduce competition and allow trees to become established.

The DMME encourages operators and landowners who propose to implement a post mining land use of forestry to follow these practices and incorporate such into the reclamation plans. In the event that the operator or landowner wishes to propose an alternative reforestation plan, the minimum success standards established under §§[4VAC25-130-816.116](#) and [4VAC25-130-817.116](#) would have to be met and the DMLR will establish a minimum success standard for the necessary herbaceous coverage that will be required to ensure successful reforestation.

If you have any questions concerning this guidance memorandum, please contact the DMLR's Agronomist at 276-523-8155 or the Technical Services Manager at 276-523-8156.

### ***REFERENCES***

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